UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,002	01/31/2006	Kalyan Handique	19662-0035US1	9849

26181 7590 12/01/2008

FISH & RICHARDSON P.C.
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER	
RAMDHANIE, BOBBY	
ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
12/01/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

Office Action Summary	Application No.	Applicant(s)	
	10/567,002	HANDIQUE ET AL.	
	Examiner	Art Unit	
	BOBBY RAMDHANIE	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,16 and 18-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,16 and 18-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 July 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 07/30/2008 have been fully considered but they are not persuasive. The following reasons are why:

2. Applicants argue that PARUNAK ET AL is not prior art for rejections under 103. PARUNAK et al qualifies as prior art under 102(a) and therefore the 103(c) exclusion does not apply.

3. For Claim 1, Applicants' argue that PARUNAK ET AL does not disclose a pressure actuator that recombines at least some of the first portion of the liquid separated from the particles. Applicants believe that PARUNAK ET AL does not disclose this structure. The Examiner respectfully disagrees.

4. PARUNAK ET AL discloses the pressure actuator (Item 168) that may be a plunger or diaphragm (See Page 15 lines 10-15). PARUNAK ET AL further discloses that the flow through member is paper, textiles, polymers having networks of pathways, and glass materials such as glass frits (See Page 13 lines 7-11). The Examiner believes that since the flow through member is not a one-way, the liquid may flow back during the use of the mechanical vacuum actuator, which is capable of performing the task that "recombines at least some of the first portion of the liquid separated from the particles."

5. Further, the pressure actuator (a plunger or diaphragm) is clearly configured to recombine at least some of the separated particles with a subset of the first portion of the liquid separated from the particles because the action of the plunger or diaphragm

would inevitably act on the particles that are adsorbed onto the side of the flow through member with the original liquid.

6. Applicant's arguments, see Remarks, filed 08/25/2008, with respect to the rejection(s) of claim(s) 7 under 102 has been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of PARUNAK ET AL.

7. Applicants' argue that PARUNAK ET AL does not anticipate Claim 7. The Examiner has withdrawn the rejection; however, a new ground of rejection is made because it would have been obvious to one of ordinary skill in the art to incorporate "recombining the retained particles with the subset of the first portion of the liquid" for a multitude of reasons; two of which are 1). It is well known in the art that filters will clog from the particles or cells adsorbing to the surface of the filter thereby reducing the efficiency of the filter to perform its task, to remove the particles or cells from the filter, or to prevent lysis of the cells at the filter interface thereby releasing cellular product not wanted in the filtered fluid stream.

8. For Claim 9, Applicants argue that Claim 9 recites a limitation of a "pressure activator." **There is no such limitation in Claim 9.**

9. For Claim 14, Applicants argue that PARUNAK ET AL does not disclose "a vacuum generator integral with the substrate," as recited. Applicants further argue that this is a conclusion of the Examiner. The Examiner respectfully disagrees. This is not the conclusion of the Examiner – it is a fact that is disclosed by PARUNAK ET AL (See Abstract). PARUNAK ET AL literally states, "the gas actuators are integral with the

substrate." A mechanical actuator or plunger or diaphragm reads upon "a mechanically actuated vacuum generator" as recited in Claim 14.

10. For Claims 18 & 19, Applicants argue that PARUNAK ET AL does not disclose a mass of TRS is disposed in a passage downstream of, and connecting to, a lysing chamber. The Examiner respectfully disagrees. The TRS is positioned in a channel downstream from the lysis chamber (See Figure 4, the lysis chamber is Item 160, Item 204 is located in a channel extending from the lysis chamber and is also downstream from the chamber). This clearly anticipates the instant Claims. Further, this TRS mass, functions as recited in Claims 18 & 19. Function A). To inhibit downstream passage of material when material is introduced to the lysing chamber (air from the outside is prevented from entering into the vent) and B). To pass downstream upon being heated to allow downstream passage of material from the lysing chamber (gas is vented - the TRS is thermally activated).

Response to Amendment

Claim Objections

11. Claim 8 is objected to because of the following informalities: Claim 8 is recited to be dependent on Claim 8. Appropriate correction is required. The Examiner will examine this claim as if it were dependent on Claim 7.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

13. Claims 1-6, 9, 14, & 18 are rejected under 35 U.S.C. 102(a) as being anticipated by PARUNAK ET AL (WO03/012406).

14. Applicants' claims are toward a device.

15. Regarding Claims 1-6, 9, 14, & 18 PARUNAK ET AL discloses the microfluidic device, including: A). An input port for receiving a particle-containing liquidic sample (See Page 12 line 17 Item 180); B). A retention member in communication with the input port and configured to spatially separate particles of the particle-containing liquidic sample from a first portion of the liquid of the particle containing liquidic sample (See Page 13 lines 7-11); and C). A pressure actuator configured to recombine at least some of the separated particles with a subset of the first portion of the liquid separated from the particles (See Page 15 lines 10-15).

Additional Disclosures Included: Claim 2: The pressure actuator is configured to reduce a gas pressure inside the device and in communication with the particles (See Figure 4 Item 168); Claim 3: A ratio of a volume of the subset of the first portion of liquid to the first portion of liquid is at least 1% (See Figure 3; the pressure actuator is capable of performing this intended use); Claim 4: A ratio of a volume of the subset of the first portion of liquid to the first portion of liquid is less than 25% (See Figure 3 Item 168, the pressure actuator is capable of performing the intended use); Claim 5: The retention member is a filter (See Page 13 lines 7-11). Claim 6: The device includes a reservoir configured to receive at least some of the first portion of the liquid, and

wherein a pressure within the reservoir increases upon receiving the first portion of the liquid (See Page 12 Enrichment module, specifically Item 400 See Page 13 lines 15-17); Claim 9: A microfluidic device for processing a particle-containing liquid sample, including: A). An enrichment region (See Figure 3, Enrichment module), including: 1). A retention member configured so that liquid of a particle-containing liquid sample received therein exits the enrichment region along an exit path including a first surface of the retention member and particles of the particle-containing liquid sample are retained by the retention member (See Page 13 lines 7-11); and C). A pressure actuator configured to introduce fluid into the enrichment region along an entry path including the first surface of the retention member, wherein the entry path is substantially opposite the exit path (See Column 3 line 28 to Column 4 line 5 & See Figure 4 sample is introduced into inlet 180 which the actuator introduces fluid into the enrichment region along an entry path that is "substantially opposite the exit path."; Claim 14: A device for concentrating particles of a particle-containing fluid, including: a substantially planar substrate including a microfluidic network; and a mechanically actuated vacuum generator integral with the substrate, the vacuum generator including an expandable chamber in fluidic communication with the microfluidic network; Claim 18: A microfluidic device, comprising: A). A lysing chamber having a volume of less than 10 microliters (See Page 9 lines 17-18); B). An upstream channel leading to the lysing chamber and a downstream channel extending from the lysing chamber (See Figure 3); and C). A mass of a temperature responsive substance (TRS) disposed in the downstream channel, the mass of TRS configured (a) to inhibit downstream passage of

material when material is introduced to the lysing chamber and (b) to pass downstream upon being heated to allow downstream passage of material from the lysing chamber (See Page 12 lines 25-28 & Page 25 lines 1-5).

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

18. Claims 7, 8, 10-13, 16, & 19-21 are rejected under 35 U.S.C. 103(a) as being obvious over Parunak et al.

19. Regarding Claims 7, 8, 10-13, 16, & 19-21, PARUNAK ET AL discloses the method for processing a particle-containing liquidic sample, including: A). Inputting a particle-containing liquidic sample into a microfluidic device including a retention member including a first surface (See Page 12 lines 16-20); B). Spatially separating a first portion of the liquid of the particle-containing liquidic sample from particles of the

liquidic sample by passing the first portion of the liquid through at least the first surface of the retention member (See Page 3 lines 17-20 & Page 15 lines 3-15). PARUNAK ET AL does not disclose recombining the retained particles with a subset of the first portion of the liquid. PARUNAK ET AL does disclose the use of plungers and diaphragms to act on the particles that are retained by the retention member (See Page 15 lines 10-15). It would have been obvious to one of ordinary skill in the art to incorporate "recombining the retained particles with the subset of the first portion of the liquid" because it is well known in the art that filters will clog from the particles or cells adsorbing to the surface of the filter. It would have also been obvious to one of ordinary skill in the art at the time of the invention to incorporate "recombining the retained particles with the subset of the first portion of the liquid to remove the particles or cells from the filter.

20. For Claim 8, PARUNAK ET AL discloses the method of claim 7, except wherein recombining the retained particles includes reducing a pressure within the microfluidic device. PARUNAK ET AL does however disclose the method for which the pressure actuator comprises a vacuum or diaphragm. It would have been obvious to one of ordinary skill to essentially recombine at least some of the retained particles with the filtered liquid as well as with the unfiltered liquid because these devices reduce pressure within microfluidic device which would pull the particles away from the filter and recombine them with the liquid. This would lead to better efficiency of the filter (from not being clogged), prevent particles from rupturing during filtration, and reduce the filtering time of the sample.

21. For Claim 10, PARUNAK ET AL discloses the method for enriching a sample, including: introducing a particle-containing fluidic sample to a microfluidic network; applying a pressure to the fluidic sample to expel a first amount of the fluid of the fluidic sample through a filter configured to retain particles of the fluidic sample within the microfluidic network (See Page 12 lines 16-20, Page 3 lines 17-20 & Page 15 lines 3-15); and subjecting retained particles of the fluidic sample to a reduced pressure (See Page 15 lines 10-15). PARUNAK ET AL does not explicitly disclose that this reduced pressure is to cause a second, smaller amount of fluid of the fluidic sample to enter the microfluidic network through the filter and entrain the particles to form an enriched particle-containing sample. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of PARUNAK ET AL and include a plunger or diaphragm to reduce the pressure acting on the particles of the because PARUNAK ET AL discloses that reduced pressure generation techniques create a pressure differential across the sample that moves the sample from the enrichment zone (See Page 15 lines 10-15).

22. Additional Disclosures Included: Claim 11: Applying a pressure includes mating a syringe to an input port of the microfluidic network (See Page 21 lines 1-5); Claim 12: The step of introducing the particle-containing fluidic sample also applies the pressure to expel the first amount of fluid (See Page 15 lines 3-9); and Claim 13: Subjecting the particles of the fluidic sample to a reduced pressure includes creating a vacuum within the microfluidic network and placing the vacuum in communication with the retained particles (See Page 15 lines 10-25).

23. For Claim 16, PARUNAK ET AL discloses the method for enriching a particle-containing fluidic sample, including: A). Contacting a particle-containing fluidic sample PCFS) with a filter so that a first portion of the fluid of the PCFS passes through the filter and particles of the PCFS are retained by the filter, the fluid passing through the filter entering a chamber and increasing a pressure therein (See Page 12 lines 16-20 & Page 3 lines 17-20). PARUNAK ET AL does not disclose allowing a second, smaller portion of the fluid to pass back through the filter and recombine with the particles retained by the filter. PARUNAK ET AL does however disclose the use of plungers and diaphragms that act on the particles retained by the filter. It would have been obvious to one of ordinary skill in the art to incorporate "recombining the retained particles with the subset of the first portion of the liquid" because it is well known in the art that filters will clog from the particles or cells adsorbing to the surface of the filter. It would have also been obvious to one of ordinary skill in the art at the time of the invention to incorporate "recombining the retained particles with the subset of the first portion of the liquid to remove the particles or cells from the filter.

24. For Claim 19, PARUNAK ET AL discloses the method for lysing cells of a cell-containing sample, comprising: A) Introducing the cell-containing sample to a lysing chamber of a microfluidic device (See Page 12 lines 16-20, Page 3 lines 17-20 & Page 15 lines 3-15); B). A downstream channel extending downstream from the lysing chamber, the lysing chamber having a volume of less than 10 microliters (See Page 9 lines 17-18); C). A mass of a responsive substance (RS) disposed in the downstream from the lysing chamber inhibiting downstream passage of the sample from the lysing

chamber (See Page 20 lines 1-6); D). Heating cells within the lysing chamber to a temperature sufficient to release intracellular material; and E). Heating the TRS, whereupon the TRS and intracellular material pass downstream (See Page 18 line 6 to Page 20 line 6 – the application of voltage to electrodes which act upon the lysis chamber invariably produces heat). PARUNAK ET AL does not explicitly disclose that the mass of a responsive substance is temperature responsive. PARUNAK ET AL does however disclose that this masse is acted upon by electrodes (See Page 20 lines 1-6). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the mass to be a temperature responsive mass because this would allow passage of the material of the lysing zone upon reaching a particular voltage.

25. For Claim 20, PARUNAK ET AL discloses the method for processing a sample, comprising: A). Introducing a sample to a microfluidic network of a microfluidic device, wherein the introduction generates a gas pressure within a reservoir in communication with the microfluidic network (See Page 3 lines 28-30 & Page 25 lines 16-20); storing the pressure within the reservoir; and then using the gas pressure to move the sample within the microfluidic network (See Page 3 line 30 to Page 4 line 1)

26. For Claim 21, PARUNAK ET AL discloses the method of claim 20, wherein using the gas pressure comprises heating a temperature responsive substance within the microfluidic device (See Page 4 lines 1-5 & Page 25 lines 1-5 & 16-20).

Telephonic Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BOBBY RAMDHANIE whose telephone number is (571)270-3240. The examiner can normally be reached on Mon-Fri 8-5 (Alt Fri off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/B. R./

/Walter D. Griffin/
Supervisory Patent Examiner, Art Unit 1797